

Applications of synchrotron-based analysis in Soils and Crops research

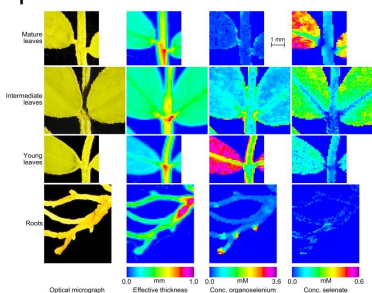


Poster by Toju Ogunremi¹ and Colleen Christensen²
¹ College of Agriculture ² Canadian Light Source Inc.



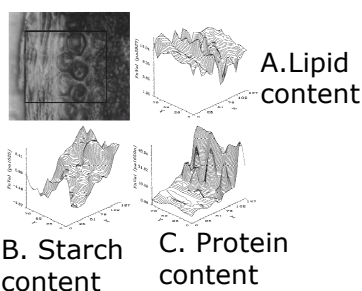
1 College of Agriculture Synchrotron Liaison Coordinator
 Mandate: synchrotron reference and opportunities coordinator for the College of Agriculture researchers
 Co-funded by the U of S, College of Agriculture and CLSI.

Quantitative, chemically specific Imaging of selenium transformation in plants



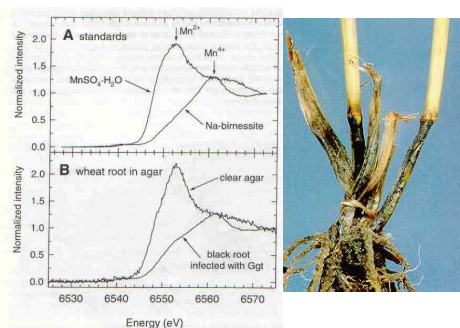
Selenate is transported throughout the plant. The distribution of selenate and organic forms varies with tissue and developmental stage. [Pickering, I.J. et al., 2000](#)

Infra Red Studies of Corn Composition



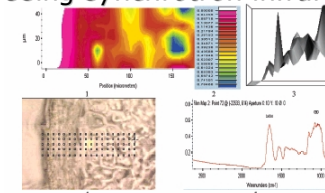
Ability to map chemical composition of tissues. Protein increases from pericarp to endosperm. [Wetzel et al., 1998](#)

Take-All disease in wheat



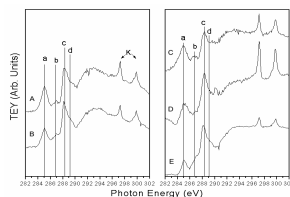
Results show Mn²⁺ in clear agar, Mn⁴⁺ around dark infected roots. Mn oxidation states can be measured during pathogenesis. [Schulze et al., 1995](#)

Chemical Ratios within Barley Using synchrotron infrared



Protein relative to total CHO map from pericarp to endosperm. Pericarp has no protein associated with it, protein concentration is increased from seed coat to endosperm. [Yu et al., 2003](#)

Carbon K-edge XANES spectra of selected Saskatchewan wetlands soils.



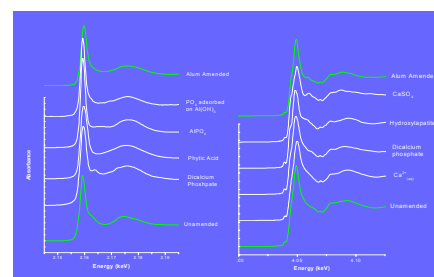
(A) Melfort 6; (B) Melfort 7; (C) St. Denis 5; (D) St. Denis 3; (E) St. Denis 3 LFH. Peaks labeled a through d refer to: (a) aromatic C, (b) aliphatic C, (c) carboxylic acid C and (d) O-alkyl C, [Jokic, A. et al., 2003](#)

Protein Crystallography: Bt proteins



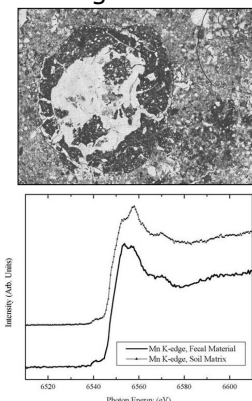
3D structure of the Cry1Aa Bt endotoxin protein used to kill Spruce budworms. [Grochulski and Masson, 2003](#)

Solid state speciation of phosphate in poultry litter using XANES spectroscopy



Alum amendment results in formation of Al(OH)₃, followed by Absorption. No evidence of AlPO₄ precipitation. [Peak, D. et al., 2002](#)

Effects of Earthworms on Soil Manganese



Not only do worms move material but they change the speciation of the metals. [Ron Martin, UWO](#)